Cotton Research Today . . . and Tomorrow

The farm value of cotton grown in the United States today is about $4 billion a year, placing it among the Nation's top six field crops. Its worth is multiplied many times beyond its crop value when it goes into textiles, apparel, and industrial products. But while cotton continues to be big business in this country, it will take continuing and aggressive research to keep it that way. For American cotton today faces competition, not only from synthetic fibers, but also from cotton grown in foreign countries. Worldwide, cotton production is on the increase. To survive, U.S. cotton must be the world's quality cotton, produced at a cost competitive with synthetics and large-volume foreign cotton producers.

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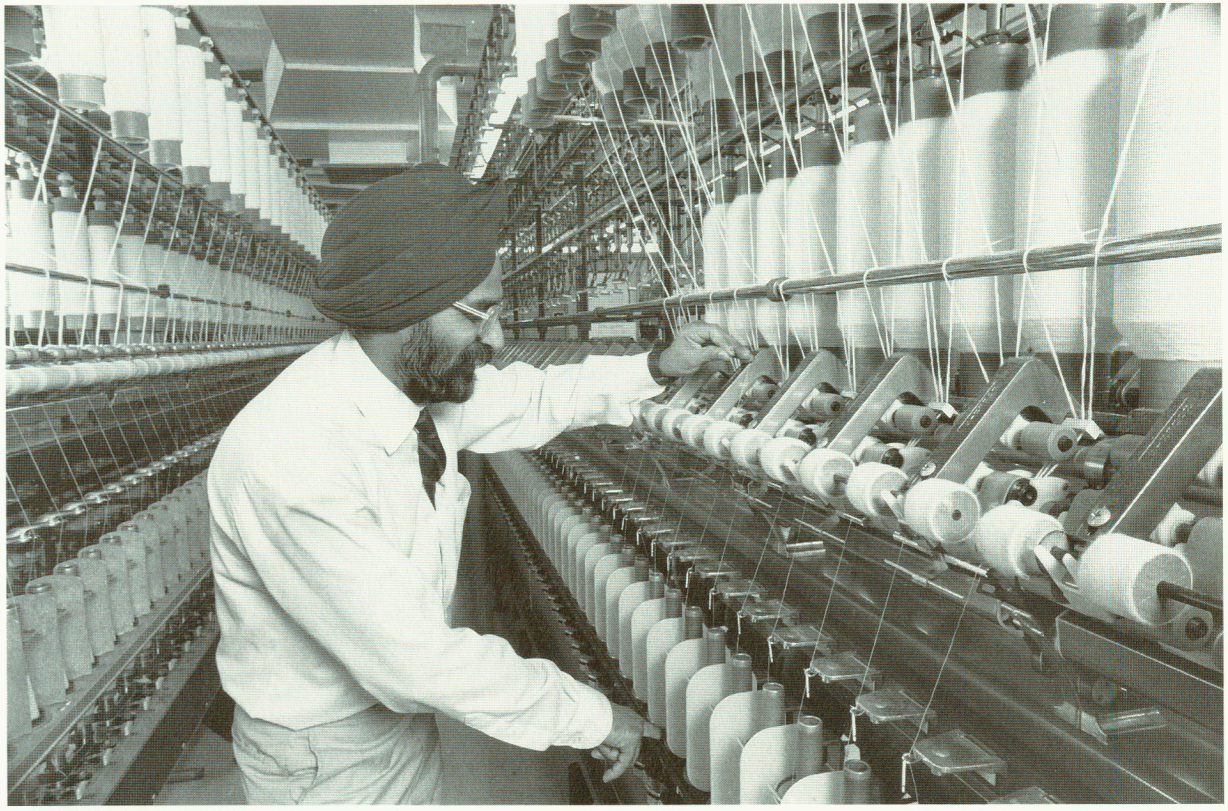
The Agricultural Research Service is engaged in several research programs aimed at helping cotton maintain and improve its competitive position. One approach is to improve cotton production and ginning. Another is to improve cotton fiber by finding ways to produce cleaner, stronger cotton with longer fiber staple length and greater uniformity.

To help the processor lower costs, ARS is developing technology to produce higher turnout in ginning and is seeking new ways to cut costs in spinning and dyeing. It is taking a look at the whole farm-to-consumer system for cotton to see if that system can't be made more efficient. Finally, ARS researchers, and those at the New Orleans laboratory in particular, are exploring new ways to modify cotton fabrics chemically to develop 100-percent cotton products that are durable, dyefast, and permanently pressed, while still retaining cotton's attractive feel and comfort. They are also seeking better methods for imparting easy-care properties to cotton fabrics while increasing their wear life. Another goal is quick-response technology that will render easy-care cottons dyeable after a garment is manufactured.

Recent laboratory tests at SRRC have demonstrated that the lab's new no-formaldehyde process for making wash-and-wear fabrics from 100-percent cotton is not only safer for textile mill workers but also results in fabrics with much improved durable-press properties. Work is continuing to move this important research from the New Orleans laboratory to commercial application.

To increase U.S. chances for achieving needed improvements in fiber strength, length, and other desirable properties, ARS has established a national cotton-quality program. Improvement starts with measuring the variables that the grower will be paid for. ARS labs at New Orleans and Clemson, South Carolina, are working on high-speed methods for measuring trash, short fiber content, and fiber maturity. Other specific research goals assigned to the Southern laboratory include:

- Finding out more about the basic molecular mechanism that controls the growth of the cotton plant and that of the fiber.
- Carrying out investigations of the structure of cotton fiber.
- Conducting background research to improve quality and cost of processing cotton fiber in ginning and in the textile plant.
- Improving finishing of cotton and cotton-blend fabrics.
- Developing better methods for monitoring small quantities of formaldehyde in the workplace.



SRRC cotton technologist A. Paul Sawheny checks on patented new system to blend more cotton fiber with synthetic fibers to make fabrics that combine strength of synthetics with comfort and breathability of 100-percent cotton.

- Imparting flat drying properties to cotton fabrics that do not contain formaldehyde.

These and other projects are carried out in New Orleans by specialized teams of scientists. One focuses on improving the all-important properties of fiber strength and length. While strength and length are measured for every bale of cotton, scientists still know too little about how cotton fiber growth determines fiber chemistry and the fiber's physical properties. The research team is investigating these relationships with many modern analytical tools. So far, it has made several basic discoveries, including the carbohydrate composition of the growing fiber and the biochemical changes that occur during fiber growth.

Another team is studying the effects of stress on cotton plants. It identifies changes in the cotton fiber molecules that result from adverse weather, such as a freeze or drought. The team has learned that the molecular structure of the cotton fiber influences its strength and therefore its quality. These basic findings will help farmers produce higher quality cotton for processing and eventually mean longer product wear-life for the consumer.

One scientific group in New Orleans uses highly sophisticated equipment to determine the pore structure of cotton. Cotton's porosity is directly related to its ability to take up dye. For the first time, SRRC scientists are learning the impact of various processing treatments, like scouring, bleaching, and mercerization, on the size of cotton pores and therefore on the cotton's accessibility to chemical agents and dyes.